

1. -An apparatus for engaging in heat transfer with a flowing fluid, comprising:

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a first channel boundary which is a heat transfer surface and an interchannel boundary which is a heat transfer surface, the first channel boundary and the interchannel boundary at least partially defining a first channel which is configured to confine a first channel flow of the fluid, the first channel boundary and the interchannel boundary both being disposed to engage in heat transfer with the fluid in the first channel;

and

a second channel boundary which is a heat transfer surface, located such that the interchannel boundary is between the first channel boundary and the second channel boundary, the second channel boundary and the interchannel boundary at least partially defining a second channel which is configured to confine a second channel flow of the fluid, the second channel boundary and the interchannel boundary both being disposed to engage in heat transfer with the fluid in the second channel.

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the first channel comprising a first channel upstream region having a first channel upstream region flow cross-sectional area, in series with a first channel downstream region having a first channel downstream region flow cross-sectional area,

the second channel comprising a second channel upstream region having a second channel upstream region flow cross-sectional area, in series with a second channel downstream region having a second channel downstream region flow cross-sectional area,

the first channel upstream region flow cross-sectional area being greater than the first channel downstream region flow cross-sectional area, the second channel downstream region flow cross-sectional area being greater than the second channel upstream region flow cross-sectional area,

and further comprising, in the first channel upstream region, additional first channel upstream region heat transfer surface disposed to engage in heat transfer with the fluid in the first channel upstream region,

and, in the second channel downstream region, additional second channel downstream region heat transfer surface disposed to engage in heat transfer with the fluid in the second channel downstream region

wherein

the first channel upstream region has a first channel upstream region total heat transfer surface area in contact with the fluid in the first channel upstream region,

and the first channel downstream region has a first channel downstream region total heat transfer surface area in contact with the fluid in the first channel downstream region,

and the second channel upstream region has a second channel upstream region total heat transfer surface area in contact with the fluid in the second channel upstream region,

and the second channel downstream region, has a second channel downstream region total heat transfer surface area in contact with the fluid in the second channel downstream region,

and wherein

the first channel upstream region total heat transfer surface area and the second channel upstream region total heat transfer surface area define a heat transfer surface area distribution factor which is the larger of those two quantities divided by their sum,

and the first channel upstream region flow cross-sectional area and the second channel upstream region flow cross-sectional area define a flow cross-sectional area distribution factor which is the larger of those two quantities divided by their sum,

and wherein the heat transfer surface area distribution factor is greater than the flow cross-sectional area distribution factor.